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ABSTRACT

The paper examines issues related to analysis of cost effectiveness in human service research. Distinctions are made between cost-effectiveness analysis and cost-benefit analysis. A review of research focuses on 214 cost effectiveness studies in three human service program areas: early intervention for handicapped children, mental health programs, and special education programs. Evaluation of the research revealed that the term "cost effectiveness" has been frequently used, but only a small portion of the articles actually presented cost effectiveness data per se. Five criteria were applied to 22 studies categorized as cost effectiveness articles; a relatively low percentage adequately met all the criteria. Problems typically found included: not specifying valuation methods, developing cost effective ratios with the inclusion of nonbudgeted costs, and not comparing two more program alternatives in developing these ratios. (CL)

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A Critical Survey of Cost-Effectiveness Analysis in Human Service Research

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Introduction

Role of Cost-Effectiveness Analysis in Evaluation Research

Evaluation research should provide a decision-making framework to identify program and policy alternatives which achieve social objectives (Levin, 1975; Thompson,. 1980). Unfortunately, evaluation researchers have traditionally only focused on the identification and measurement of program benefits, typically dwelling on the statistical significance of the outcome measures. Because any social alternative results in outcomes as well as expended resources (costs), a truer indication of the net worth or impact of a given alternative includes not only an assessment of program outcomes or effects, but also a concurrent examination of program costs or sacrificed resources. The vast majority of program evaluations in human service research do not even report costs, let alone analyze them. With the growing consciousness that public funds and other resources are finite, evaluators and decision-makers are recognizing that program effects which are not considered in the context of associated sacrificed costs may not suffice to justify program funding.

The primary role of cost-effectiveness analysis in evaluation research is to identify that alternative or strategy that maximizes the desired outcome for any particular resource or budget limitation (Levin, 1975). In the current realm of social program policy-making, the costs as well as the effects of alternative strategies must be considered in order to maximize the use of limited resources devoted to the public welfare. To represent a responsible allocation of scarce resources, a program will be required to demonstrate the practical significance of

its benefits. It will no longer suffice to base policy and program decisions on statistically significant results in outcome alternatives; the alternative which appears more effective in terms of comparative outcomes may have costs associated with it which outweigh its superiority in outcomes.

Cost-effectiveness analysis does not represent a radical departure from conventional evaluation research. Rather, it provides a framework for integrating cost variables into accepted experimental or quasi-experimental research designs. In order to make cost-effectiveness comparisons, data regarding the differences in the effects of particular alternatives are combined with data on the costs of implementing the alternatives. From among two or more alternatives, these comparisons identify which alternative will maximize desired outcome(s) for a given level of cost.

Cost-Effectiveness and Cost-Benefit Analysis Differentiated

For purposes of clarity, a brief comparison of cost-effectiveness analysis with the closely related method of cost-benefit analysis is useful. The framework from which cost-effectiveness analysis is derived is the more general cost-benefit analysis (synonymous with benefit-cost analysis). Cost-benefit analysis provides a means by which both the value of the benefits and the value of the costs of a particular alternative are compared directly in monetary terms. A major advantage of attempting to compare both benefits and costs in monetary value is that a common metric (e.g., dollars) is available by which the relative attractiveness of alternatives can be assessed. This permits the direct

comparison of alternatives even when common outcome measures are not available. Cost-benefit analysis evaluates the worth of an alternative by comparing the money-valued amount of "good" program effects (benefits) with the money-valued "bad" effects (costs). Cost-benefit ratios are calculated by dividing the monetary value of the expended resources by the monetary value of the derived benefits. Using this methodology, no alternative would be selected when costs exceed benefits, and in general, the alternatives chosen would be those that yielded that smaller cost to benefit ratios. The cost-benefit approach is preferred when decision-makers on methods for valuing program effects monetarily.

One difficulty in many areas of social program evaluation, however, is that decision makers disagree both on the methods to be used for the monetary valuation of outcomes and on the monetary values obtained. An important requirement for most cost-benefit analyses of alternatives is that the outcomes can be valued by their market prices. However, the outcomes of most social programs have no market counterparts. For example, what is the market value of benefits associated with an increase in reading level, or toileting skills, or communication skills? In such situations, evaluation methods that do not require monetary valuation of program outcomes become more attractive. Cost-effectiveness analysis avoids the difficult problems of valuation of outcomes by relating the monetary measures of resource cost to the effectiveness of a program in producing a particular impact. When program effectiveness in achieving a particular objective is associated to costs, the approach is considered to be a cost-effectiveness rather than a cost-

Methodology

Cost-effectiveness studies were included from three human service program areas: (a) handicapped early intervention program, (b) mental health programs, and (c) special education programs. The following computerized data bases were searched in locating studies in the three areas: (a) ERIC, (b) Exceptional Children, (c) Dissertation Abstracts, and (d) Psychological Information. The following key descriptors were used to identify potential articles for this paper: (a) "cost-effectiveness," (b) "cost-benefit analysis," (c) "cost analysis," and (d) "program costs." All studies included in this survey contained a "cost term"either in the title, the abstract, or in the descriptor list.

Critical Criteria Considered

As previously mentioned, several critical criteria were applied to assess each of the reviewed studies. Each of the studies were critiqued to determine whether the following desirable elements were included as part of their design:

1. Alternatives compared. Did the studies compare alternatives in determining cost-effectiveness? The purpose of cost-effectiveness analysis in human service research is to identify the alternative which accomplishes the desired social objective for the least sacrificed cost. In order to conduct a true cost-effectiveness analysis, the question must be posed: "Is alternative 'A' more cost-effective that alternative'B'?" An alternative or program cannot be satisfactorily compared to doing nothing. Comparing a social alternative with doing

nothing distorts the cost-effectiveness ratios and is similar to asking, "Which is better: any social program which is implemented to assist and improve the lives of individuals or doing nothing?"

2. Outcome measures. Are appropriate outcome measures used to assess program effects? The purpose of this paper is not to address the standard methodological concerns regarding appropriate selection and application of outcome measures (e.g., reliability, validity, testing bias, psychometric properties, etc.). Rather, the comprehensiveness of the outcome measures are considered. Most cost-effectiveness analyses are based on only a single or narrow range of outcome measure (such as IQ scores) rather than taking into account the diverse and long-term impacts that the program may have had. Also, cost-effectiveness analyses should include the measurement of disbenefits as well as benefits.

3. Resources considered. Are all resources which are necessary to implement an alternative considered in the analysis? A critical feature of conducting a quality cost-effectiveness analysis is to consider not only budgeted items but to consider those resources which are "hidden" or not obvious from the operating budget. The position is taken that these "hidden" items represent real costs to the program and typically include such ingredients as volunteer time, donated facilities, and donated equipment and materials. These hidden resources are often essential to the implementation and operation of the program and often represent a significant portion of the actual resources expended.

4. Valuing nonbudgeted resources. How are nonbudgeted costs valued? An interesting and often controversial area of cost-effective-

ness analysis has to do with the valuing of those ingredients or resources for which no market value presently exists. For example, some investigators might assign a cost value to parents' volunteer time as the minimum wage; others might argue that parents' time is worth that which the parent would ordinarily earn during his or her regular job. Still, others would indicate that the value of parent time is equivalent to the cost of a program intervenor. At any rate, it is important for the researcher to consider and report various possibilities for valuing items such as volunteer time and other ingredients for which no clear market value exists.

5. Costs and outcomes analyzed jointly. Are cost and outcome data integrated? A highly attractive feature of cost-effectiveness analysis is the ability to relate costs directly with units of effect. The result of this joint analysis is a cost-effectiveness ratio. Several studies have included a cost analysis and an effects analysis. However, the data were not presented in a way which allowed the determination of a cost per unit of effect (i.e., a cost-effectiveness ratio).

Results

A search of four computerized data bases yielded a total of 214 articles. The articles were categorized as follows:

1. Articles which are erroneously labeled. These articles contained a cost-effectiveness term in their title, abstract, or descriptor list, but did not deal with cost-effectiveness issues. A total of 113 articles or 52% of the 214 articles were categorized as "erroneously labeled." As can be seen in Table 1, the remaining 101 articles were sorted into the following categories.

Table 1

Types of Cost-Effectiveness Articles

	Mental health	Special education	Early intervention	Other	Totals (%)
"Low cost" articles	6	6	2	5	19 (19%)
"Should be" articles	21	21	4	6	52 (51%)
Cost comparison articles	1	4	2	1	8 (8%)
Cost-effectiveness articles	4	12	6	-	22 (22%)
Totals	32	43	14	12	N = 101 (100%)

2. "Low cost" articles. These are articles which purported to examine low cost or cost saving methods of achieving a certain social objective. These articles did not compare alternatives nor were any cost data included. A total of 19 articles fell into this category, representing approximately 19% of the remaining 101 articles. Of these 19 articles, 6 fell into the category of mental health, 6 fell into the category of special education, 2 fell into the category of early intervention, and 5 were categorized under the label of "other" which indicated that the articles did not neatly fall into one of the three human service program areas.

3. "Should be" articles. These articles consisted of nonexperimental discussion and review papers which typically urged researchers to carry out cost-effectiveness studies. These articles did not contain cost data. A total of 52 articles or 51% of the 101 articles fell into this category: 21 in the mental health area, 21 in the special education area, 4 in the early intervention area, and 6 as "other".

4. "Cost comparison" articles. These articles did not report cost data; however, the effects data were not directly related to these costs. Cost-effectiveness ratios were not constructed. A total of 8 articles fell into this category: 1 in the mental health area, 4 in the special education area, 2 in the early intervention area, and 1 in the "other" category.

5. "Cost-effectiveness" articles. These were articles in which both cost and effects data were presented. A total of 22 articles or 22% of the 101 articles fell into this category (this represented approximately 10% of the total number of articles surveyed which

purportedly contained cost-effectiveness data). A total of 4 of these articles fell into the mental health area, 12 fell into the special education area, and 6 under early intervention.

From these data, it appears that the term "cost effectiveness" (or similar cost terms) is used frequently in human service literature. However, only a small portion of these works actually present cost-effectiveness data per se. Furthermore, those works which do not purport to contain cost-effectiveness analyses often misuse the term "cost-effectiveness" in an effort to convey the notion of low cost.

The aforementioned criteria which are considered essential to a high quality cost-effectiveness analysis were applied to the 22 studies which were categorized as "cost-effectiveness" articles. As can be seen in Table 2, a relatively low percentage of the studies adequately met all the critical criteria. The most frequent shortcoming was the failure to include all costs (resources) associated with program implementation. Only 27.3% of the articles reviewed considered nonbudgeted resources as a component of their analysis. The second most frequent abuse of the suggested cost-effectiveness criteria was the failure to value items which did not have market values. This is not surprising considering that most items which do not have market values fell into the category of nonbudgeted resources. Only 40.9% of the articles contained at least some valuing of program ingredients which did not have readily available market values. Fifty percent of the articles revieved contained outcome measures which were comprehensive and considered appropriate for the goals of the programs.

Cost-Effectiveness Analysis

Table 2

Per Cent Articles Conforming to CE Criteria

Intervention area	Two or more alternatives	Appropriate outcome	All resources considered	Items without market values valued	Costs and effects analyzed simultaneously
Mental health	9.1%	9.1%	0%	0%	18.2%
Special education	36.4%	31.8%	18.2%	22.7%	31.8%
Early intervention	9.1%	18.2	9.1%	18.2%	18.2%
Total	54.5%	50.0%	27.3%	40.9%	72.7%

The following points regarding a relatively well-conducted cost-effectiveness analysis of a residential program for behaviorally disturbed children (Yates, 1977) typify three of the most frequently occurring problems found in human service cost-effectiveness studies. Basically, the Yates study assessed the cost effectiveness of a behavior management program designed to increase socially desirable behavior and decrease undesirable behaviors.

1. Valuation methods unknown. Costs of different components of the program were calculated from both budgeted and nonbudgeted categories. However, the method for valuing personnel facilities and equipment was not specified. In order to make intelligent decisions using CE ratios, it is crucial that the valuation method(s) be known. Selecting an evaluation method over another may drastically alter the resultant CE ratios.

2. CE ratios were developed without inclusion of nonbudgeted costs. Considering that personnel costs are by far the most costly program ingredient and that nonbudgeted personnel costs represented about twice the cost of budgeted personnel costs, it is unfortunate that the cost-effectiveness ratios did not include nonbudget figures. Better yet, CE ratios might have been calculated both ways, thus providing valuable information to decision-makers who can assess how different sources of resources affect program viability.

3. Alternatives not compared. The study did not actually compare two or more program alternatives in developing CE ratios. Rather, ratios were generated by comparing the effects measure (i.e., behavior frequencies) with the comparative behavior frequencies of normal

children. (Z scores were calculated so that a positive Z score meant the child was "better" than normal. A negative Z score meant the child was "worse" than normal.) Comparing the behavior frequencies of handicapped with nonhandicapped children lends additional perspective to the impact of the study. It better addresses the important question, "Is the program facilitating normalization?" However, this type of comparison does not serve the same function as does comparing two alternative methods for achieving a particular set of outcomes. We are still left with no answer to the critical cost-effectiveness question: "Is the program cost effective compared to an alternative?"

Several strengths of the Yates (1977) study are also noted.

1. Disaggregation by ingredient and by child. The data are disaggregated by the various program ingredients (personnel, facility, equipment, materials, etc.). Also, costs are disaggregated by child. This type of disaggregation allows the researcher or decision maker to identify the specific costs for a particular program component or for a particular child. This type of information can be particularly useful to human service program managers as they assess which program subcomponents maximize effects for which child (or subpopulation of child).

2. Optimal attendance considered. Fluctuations in costs and effects per child are shown as a function of time. The authors point out that variations in attendance probably account for the changing per child costs. This type of information may give managers an indication of whether the program can reduce per child costs without adversely affecting positive program effects.

3. Disadvantages considered. The study assessed the degree to which undesirable behaviors changed as a function of program impact. This strategy is sound regardless of whether behaviors increase or decrease. In this study, undesirable behaviors increased and the authors showed how this information was used to adjust future programmatic procedures.

4. Outcomes were appropriate and longitudinal. The study included the measurement of both fine and gross indicators of program impact. Frequency counts of individual behaviors were kept via an observation system, and gross indicators of program impact consisted of an assessment of recidivism. Recidivism measures were available for up to three years after program termination.

Summary

The evaluation of human service programs has too long focused only on their main effects without considering the costs associated with attaining such effects. In times of economic austerity, especially, researchers who do not consider cost factors in the evaluation of social programs are remiss regarding their most important function: to provide information which is useful in identifying and choosing the best alternatives to accomplish social objectives. To date, only a very small percentage of the research efforts in social programs have attempted to consider the cost component. Related to the implementation of any social alternative is not only an effect or impact, but also a cost or expense associated with accomplishing such an impact. Traditionally, program evaluation efforts have compared the relative

effectiveness of alternative methods designed to accomplish the same social objective (e.g., better educated children, reduced rates of crime, more effective interventions for the mentally ill and developmentally disabled, etc) only with respect to their results. The costs or resources expended to accomplish these results have been largely ignored. To accurately assess the impact of any social alternative, the true "worth" of the alternative must be measured not only in terms of its results, but in terms of how much it costs to accomplish those results.

Since no social programs can draw upon unlimited resources to accomplish their objectives, it is clear that the preferred alternatives are those which obtain their desired results at the least cost. The lower the cost of achieving a particular outcome, the greater the impact of the avilable resources.

The purpose of cost-effectiveness analysis in human service research is to identify the alternative which accomplishes the desired social objective for the least sacrifice or cost. Unfortunately, very few human service research studies have incorporated a cost-effectiveness analysis. Those few CE studies that have been conducted have invariably been lacking in one or more criteria seen as essential to the conduct of a comprehensive and high quality cost-effectiveness study.

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